

From: Stephen Healy
To: Linc Wehrly; Ching-Shih Yang
Subject: Fw: Battery and PHEV news--Toyota and GM
Date: 08/13/2007 09:40 AM

----- Forwarded by Stephen Healy/AA/USEPA/US on 08/13/2007 09:40 AM -----

**David
Ganss/AA/USEPA/US**
EPA-OAR,OTAQ,TCD-
AnnArbor
Sent by: David Ganss

To Chris Nevers/AA/USEPA/US@EPA, Stephen
Healy/AA/USEPA/US@EPA, Carl
Paulina/AA/USEPA/US@EPA, Simon
Mui/DC/USEPA/US@EPA, Ben Ellies/AA/USEPA/US@EPA

cc Christopher Grundler/AA/USEPA/US@EPA, Sarah
Dunham/DC/USEPA/US@EPA

Received Date:
08/13/2007 09:28 AM
Transmission Date:
08/13/2007 09:28:52 AM

Subject Battery and PHEV news--Toyota and GM

Summary:

--Toyota is delaying Li-Ion batteries due to safety concerns. The first Li-Ion cars are expected in 2011 instead of 2008-09.
--Toyota uses Panasonic batteries and their chemistry is the same as that used in laptops
--GM is planning to use a different chemistry that is much less prone to thermal runaway.
--In another article from the Detroit News, Toyota is downplaying the benefit of PHEVs.
--GM is continuing their aggressive move into PHEVs, which sets up an interesting contrast between the two companies.
--GM is also taking a two supplier path for battery suppliers for the Volt, developing systems from A123 and Compact Power.



FORMAT FOR
PRINTING
sponsored by



August 9, 2007

DOW JONES REPRINTS

Ⓜ This copy is for your personal, non-commercial use only. To order presentation-ready copies for distribution to your colleagues, clients or customers, use the Order Reprints tool at the bottom of any article or visit:
www.djreprints.com.

- [See a sample reprint in PDF format.](#)
- [Order a reprint of this article now.](#)

Toyota Delays Next Hybrids on Safety Concerns

By **NORIAHIKO SHIROUZU**

August 9, 2007; Page B1

Toyota Motor Corp., which used the green image of its gasoline-electric Toyota Prius to propel a U.S. sales surge, has decided to delay by one to two years the launches of new high-mileage hybrids with lithium-ion battery technology because of potential safety problems. The slowdown could offer **General Motors Corp.** and other rivals a chance to narrow the gap in the race to define future clean-vehicle technology.

Until recently, Toyota was preparing to roll out a dozen new and redesigned hybrids using new lithium-ion battery technology in the U.S. between 2008 and 2010. Its hybrids now use nickel-metal-hydride batteries. But safety concerns with the lithium-ion technology have forced Toyota to back away from that timetable, people familiar with the company's strategy say.

The rollout -- critical to Toyota's goal of selling 600,000 hybrids a year in the U.S. by early next decade, up from nearly 200,000 last year -- is on hold, according to Toyota executives knowledgeable about the company's hybrid-product plans for the U.S. market.

EYES ON THE ROAD



[Joseph White puts](#)² a modified "plug-in" Toyota Prius to the test -- and it gets 100 miles per gallon. Is this the future?
[Video](#)³

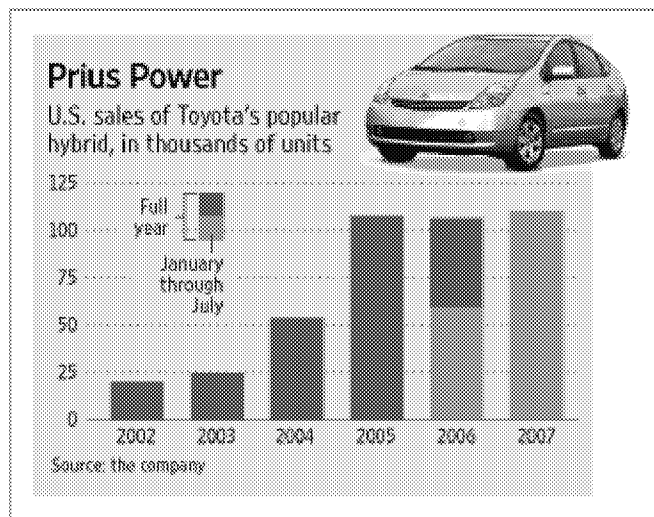
Toyota also postponed plans for hybrid versions of its big and fuel-thirsty Tundra pickup and its Sequoia sport-utility vehicle, though the executives added there is a chance Toyota would revive big-truck hybrids and come out with them by 2013 or 2014. GM and Chrysler LLC, owned by Cerberus Capital Management LLP, plan to launch hybrid large SUVs next year, using a system developed jointly by GM, Chrysler, **DaimlerChrysler AG** and **BMW AG**.

The batteries Toyota is trying to develop use particles of lithium cobalt oxide. But such batteries have shown a tendency to overheat, catch fire or even explode. Tomomi Imai, a Toyota spokesman in Tokyo, declined to comment. But, according to Toyota executives, similar problems with lithium-ion batteries for laptops made by Japan's **Sony Corp.** sounded an alarm because the chemistry of the Sony batteries was similar to batteries Toyota was trying to use for future hybrids.

Toyota became the industry's first auto maker to introduce a vehicle that taps gasoline-

electric hybrid propulsion technology in late 1997 when it launched the Prius in Japan. While rivals like **Honda Motor Co.** and **Ford Motor Co.** have matched the company with their own hybrids, GM has taken nearly a decade to catch up. Late last year the Detroit auto giant launched its first full-fledged hybrid, using the nickel-metal-hydride battery, the 2007 model year Saturn Vue Green Line crossover.

Lithium-ion hybrids, expensive in comparison to standard gas-combustion autos, won't likely sell in high volume in the near term. Still, if GM can field a plug-in hybrid ahead of Toyota, it could help the Detroit auto maker move beyond its reputation in the U.S. for old technology and poor fuel economy -- an image GM executives say is undeserved.



Toyota hit the brakes on the newer-technology hybrids because of problems with the safety of lithium-ion-battery technology, which the auto maker was counting on to make hybrids even more fuel-efficient and more affordable. Packing more electricity into the same space and weight as current systems using nickel-metal-hydride batteries, lithium-ion batteries would allow hybrids to achieve 60 to 70 miles a gallon in normal operation, compared with the 40 to 50 miles per gallon the Prius gets now.

Toyota had planned to use lithium-ion batteries starting with the next-generation Prius, originally scheduled for launch in late 2008, but has decided not to because of safety concerns, say Toyota executives familiar with the company's plans. The company will instead use the conventional nickel-metal-hydride batteries it has been using in the Prius since its launch. The next-generation Prius, using conventional batteries, is now expected to launch in early 2009.

The first Toyota hybrid that uses lithium-ion battery technology won't arrive in the U.S. until early 2011 when a derivative of the Prius, a wagon, comes out, company executives say -- a delay of at least a year from the original plan.

Tony Posawatz, GM's vehicle-line director for the Chevrolet Volt and related hybrid

vehicles, said GM's first lithium-ion hybrid will be the Saturn VUE Green Line plug-in hybrid -- which individuals knowledgeable about GM's product plans say could hit dealer showrooms as soon as late 2009. So-called plug-ins recharge batteries by plugging into the electric grid. GM also plans to launch a plug-in lithium-ion hybrid car called the Volt by 2010.

Mr. Posawatz said in an interview he is confident that GM's lithium-ion hybrid strategy is on track.



Katsuaki Watanabe

GM is counting on a different kind of lithium-ion technology. A123 Systems, a Watertown, Mass., start-up that has come up with a lithium-ion battery based on iron phosphates, which it says is more chemically stable than others, is one of a handful of likely candidates to supply lithium-ion batteries to GM.

A senior Toyota executive said the timing for the launch of Toyota's first lithium-ion-battery hybrid model is close to being finalized, though the company's medium-term hybrid plan is "still very, very fluid in some aspects." The executive said the lithium-ion Prius will most likely hit the market in early 2011 but that there is a force within Toyota's engineering and product-development division that is insisting on launching the model by the end of 2010. In that case, it could be a horse race between Toyota and GM.

Delays to the next-generation Toyota hybrids also offer an opportunity for rivals that have bet on clean diesel.

Honda for example, is pursuing a multipronged approach to alternative technologies, including a newly developed diesel engine. As Toyota grapples with lithium-ion technology, John Mendel, a senior Honda executive in the U.S., said the delays will likely provide Honda and others "a big break" to build up awareness of diesels.

Honda still sees long-term potential in lithium-ion technology, said company President

Takeo Fukui. But Mr. Fukui said he is skeptical the technology can be made reliable enough for vehicles in the next few years. By 2009, Honda plans to launch in the U.S. a subcompact hybrid with improved nickel-metal-hydrate batteries. A hybrid version of the Civic now costs about \$4,000 more than a comparably equipped gasoline-engine Civic model. With the new subcompact, Mr. Fukui says Honda is trying to cut the hybrid premium to less than \$2,000.

Volkswagen AG, BMW and the Mercedes-Benz unit of DaimlerChrysler also plan to field modern diesel engines in U.S. models starting next year. The challenge for diesel is meeting tough U.S. clean-air rules. European auto makers say they now have the technology to do that, although it will be costly at first. Fearful of being left behind, Toyota last year bought a 5.9% stake in **Isuzu Motors** Ltd. to gain access to the latter's clean-diesel technology.

Toyota's move to slow hybrid launches comes as the company's president, Katsuaki Watanabe, decelerates the company's breakneck expansion pace, which vaulted it past GM to be the world's No.1 auto maker by vehicle sales volume this year. Toyota's financial resources give it an advantage in developing more-fuel-efficient vehicles.

Aside from the planned lithium-ion Prius wagon, Toyota now plans to launch as many as nine other lithium-ion-battery hybrids in the 2011-2012 period. Among them are a new wagon-style crossover with three rows of seating and a wagon derivative of the Camry.

Write to Norihiko Shirouzu at norihiko.shirouzu@wsj.com⁴

URL for this article:

<http://online.wsj.com/article/SB118659859395791929.html>

Hyperlinks in this Article:

(1) <http://online.wsj.com/article/SB118615445855287424.html>

(2) <http://online.wsj.com/article/SB118615445855287424.html>

(3) [OpenWin\('/public/page/8_0004.html?'](#)

[bcpid=86195573&bclid=86272812&bctid=1132449099','videoplayer',993,540,'off,true,0.0,true'\);void\(''\);return false;](#)

(4) <mailto:norihiko.shirouzu@wsj.com>

Copyright 2007 Dow Jones & Company, Inc. All Rights Reserved

This copy is for your personal, non-commercial use only. Distribution and use of this material are governed by our **Subscriber Agreement** and by copyright law. For non-personal use or to order multiple copies, please contact Dow Jones

Reprints at 1-800-843-0008 or visit www.djreprints.com.

RELATED ARTICLES AND BLOGS

Related Content may require a subscription | [Subscribe Now -- Get 2 Weeks FREE](#)

Related Articles from the Online Journal

• [Toyota Faces New Hybrid Drought](#)

Blog Posts About This Topic

- [Toyota delays switching next generation hybrid cars to lithium ion batterie...](#) [practicalenvironmentalist.com](#)
- [Toyota \(TM\) hybrid stalled -- can Detroit capitalize?](#) [bloggingstocks.com](#)

More related content Powered by *Sphere* 

Toyota Downplays Value of PHEVs--Detroit News

TRAVERSE CITY -- Plug-in electric cars aren't likely the panacea they're being made out to be by a public eager for alternatives to the traditional gasoline engine, a Toyota Motor Co. engineer said on Friday.

A number of serious hurdles stand between current technology and the reality of getting plug-ins on the road, Justin Ward, an engineer with Toyota's Advanced Technology Vehicles, said to an industry gathering at the annual Management Briefing Seminars. Even if the vehicles do make it to market, he said, data shows a battery-powered plug-in may be no more efficient in reducing carbon dioxide emissions than the gas-electric hybrids on the road today.

Ward's comments come amid reports that Toyota is delaying its next-generation electric car because of safety concerns, which Toyota didn't confirm. And they stood in contrast to one of General Motors Corp.'s biggest mantras of late: that plug-ins are coming soon and the vehicles will significantly reduce auto-related pollution and U.S. fuel consumption.

"Everyone wants these benefits now. But as with any type of prototype activity, there are challenges and the challenges are real," Ward said.

GM and Toyota are racing to be first to market with a vehicle that would use a powerful lithium-ion battery. Both companies are focusing on a number of different options, which include plug-in cars that can recharge batteries via a wall outlet and hybrids that mate battery power and gasoline engine.

<http://www.autobloggreen.com/2007/08/10/autobloggreen-qanda-gm-battery-director-denise-grey/>

AutoblogGreen Q&A: GM Battery Director Denise Grey

Posted Aug 10th 2007 1:52PM by [Sam Abuelsamid](#)

Filed under: [EV/Plug-in](#), [Hybrid](#), [AutoblogGreen Q & A](#), [AutoblogGreen Exclusive](#)



After Bob Lutz made the announcement about the deal to work with A123 Systems on the cells for the Chevy Volt battery packs to be supplied by Continental, AutoblogGreen sat down to chat with GM's battery chief Denise Grey. Denise is responsible for the battery development work on all of GM's hybrid and electric programs.

AutoblogGreen: I'm here with Denise Grey who is the director of Energy Storage Systems at General Motors and you're in charge of all the battery development for hybrids and electric vehicles?

Denise Grey: That's right.

ABG: Why don't we start off by talking a little bit about the announcement that Bob Lutz made this morning about A123 Systems and GM.

DG: Okay. To put it in perspective, we've got two contracts that we announced back in the May timeframe for the Chevy Volt E-Flex System; one was LG Chem with Compact Power. Compact Power's a subsidiary of LG Chem, and that in essence covers the cells as well as the pack. The other thing in May we announced Continental which is our pack supplier. Today's announcement kind of completes the four quadrants for the cells – A123 will be providing cells to Conti for their particular system, so in essence we complete the four-piece partnership. A123 brings that nano-phosphate technology, their lithium ion chemistry to the forefront and by working with them we can understand specifically how that chemistry works, how do we create the battery state estimation protocol so that we can in essence control that system effectively. We're already doing that with Compact Power and now this gives us that additional insight from a nano-phosphate lithium ion perspective.

ABG: So basically the change in what you're doing with A123 is working more closely with

them to better understand how the battery works?

DG: Yes.

ABG: And managing that?

DG: In both ways. They get a chance to get a feel firsthand how the automotive supplier's going to actually ultimately use it, and then we also get a chance to understand how their nano-phosphate technology works so that we can again understand it appropriately so that we can use it effectively.

ABG: Does this impact Compact Power in any way?

DG: Equal opportunity here. My overall goal is that both end up with technologies that can meet all our ultimate needs. So Compact Power and Conti A123 have equal opportunity, equal chance to be in our Chevy Volt.

Gallery: General Motors E-Flex Fuel Cell



ABG: As far as the development so far on the Volt and the E-Flex architecture, how's that proceeding? Where's GM at with that right now?

DG: The plan we have is pretty much a year contract to develop the requirements to produce cells, to produce packs for our bench testing, and ultimately produce packs for our vehicle work. We've got that plan in place. We're starting to go through those various deliverables and, quite frankly, my confidence hasn't decreased in the, the number of months that we've been working on it so far. We've got a good chance of making this thing work, but we've got a lot of work to do in the meantime to get the data that goes beyond the simulation, the analysis, to really get the real data to prove that those stimulations and analyses were correct. So we're at the very beginning of that process and within this year, we'll be able to have some really good feel if we can meet our overall goals.

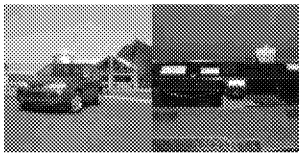
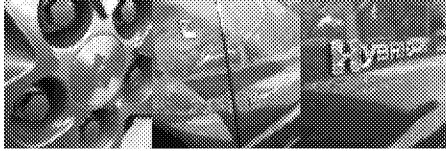
ABG: What kind of time-line does GM have for having some running prototypes with prototype lithium packs in them?

DG: We're hoping by next spring, the spring of 2008, we'll be able to have some packs with our early development vehicles, early prototypes of our particular E-Flex Volt system.

ABG: Getting away from the E-Flex for a moment, let's talk about the plug-in Vue program

which is also using lithium ion packs and A123 is one of the suppliers on that program. How's that program proceeding?

Gallery: AutoblogGreen Garage: 2007 Saturn Vue Green Line



DG: We're doing pretty good. Those contacts were announced in the early January timeframe, and again Johnson Controls/Saft and Cobasys with A123. We've already received samples of the actual cells and the cells have been going through numbers of iterative design changes in order to really zoom in on the ultimate requirements. So that's progressing pretty good. We will be receiving some packs shortly from the suppliers that we can then put in our laboratory from a pack perspective, because we already have them in our labs from a cell perspective. We'll be able to put them in our labs from a pack perspective to begin getting some integration learnings, cooling system, electronic systems, the battery management system, as well as being able to cycle these things to and fro. Additionally because it's a plug-in, we've got charger work that we have to do and there's communications between the charger, the battery pack, the vehicle systems controls, and we'll be able to do some of that work on our bench as well. So it's progressing as well, as we probably got a five-month lead time ahead of a Chevy Volt as far as deliverables, but again it's making progress, making a lot of progress.

ABG: When Rick Wagoner initially announced that program last November at LA, he talked about 2009 timeframe for delivery of that vehicle? Is that still the target?

DG: Well, I'm not quite sure of the ultimate timing. I think a lot of it's gonna be a function of how we progress for the battery. I know that timeframe and other timeframes have been talked about. But it's really going to be a function of the progress we make on these lithium ion batteries to meet all of our ultimate requirements from a power-energy perspective, from a life and being able to cycle them, being able to cool them down effectively to make sure that we can meet all of our overall program needs.

ABG: As far as the suppliers that you've chosen and some of the other suppliers that are out there, can we talk a little bit about the process that GM went through in deciding which suppliers to work with and what your criteria were?

DG: There were probably a list of 10 or 12 approximately attributes that we were evaluating each supplier on. It ranged from their power energy density. It ranged from their ability to package, to design cells in a pack that fits in the Two-mode Saturn Vue packaging activity location, and I guess that's for the Two-mode but also the same thing for the E-Flex, the

packaging of the physical integration requirements. We talked about thermal. We've got to make sure that from a Chevy Volt perspective that with the condensed packaging that we've got there that we can cool these batteries, not just from the energy, to predict the energy that the batteries create, but also based on the packaging configuration we have and the air flow, we got to make sure that they've got a credible design from a cooling strategy perspective. Electronics – there's a lot of voltage, currents, temperature sensing, cell balancing, communications with the rest of the vehicle, diagnosability, all of that electronic design has to be created; and so that was a part of our evaluation, and then last but not least amongst the criteria is timing. This program is extremely aggressive. We've got some huge timing constraints on us and so we needed to evaluate the ability of the supplier to, to provide cells, to provide packs for bench testing, for vehicle testing per our requirements; and so that amongst other requirements – we went through and we weighted all of those different parameters, went through an analysis to determine which ones would end faring out as the most profitable, most probable to come up with a design, and for the Chevy Volt that is CPI/LG Chem, as well as Continental A123 combination were those who stood out.

ABG: Another subject that comes up from the readers of AutoblogGreen regularly is the idea of battery leasing and also battery exchange programs as an alternative to fast-charging batteries in a vehicle. Can you talk a little bit about those?

DG: Yeah, I think those are excellent concepts, excellent things for us to think about. We've got, when it comes to battery life and use after useful vehicle life, there's a number of different means. These are energy storage devices that can be used for a number of different things and interchangeability and how do we somehow stretch its life or stretch its usefulness is, I think, extremely important. So all of those kind of things, leasing, interchangeability, I think all of those are amongst the subset of possibilities that we will be, we have been and we will continue to explore as possibilities.

ABG: Is there anything else you would like to add?

DG: I guess, as a last point, I just think GM, our ability to put the Chevy Volt into production is going to be a function of getting the right suppliers on board, the right suppliers with the right attitude of innovativeness, of working very closely with the OEMs and the OEMs working very closely with the suppliers and really understanding the technology and really exploiting it in an optimized way from a vehicle perspective, and so I think the suppliers that we named today, maybe the suppliers we'll name tomorrow, that's what we're ultimately looking for; those who will be with GM in general and kind of co-develop these technologies 'cause it's gonna take all of us in order to try to bring all of this to fruition.

ABG: Well, thank you very much.

Postscript: This was actually the second pass at the interview with Denise Grey. A technical issue with my recording gear messed up the first attempt. In our first conversation we touched on a couple of other issues that we didn't hit this time due to time constraints. We talked more about interchangeability of batteries which would allow drivers to pull into a service station and swap out a battery pack instead of waiting for a charge.

There are a number of issues with this. First of all because of the size of battery packs using common form factors would put more packaging constraints on car companies as far as design. More important is the issue of safety. Electrically driven vehicles have very high

voltage circuits and the handling of the connections can be very dangerous. Constantly plugging and unplugging these connections would cause a lot of wear and tear issues which would greatly reduce reliability and safety.

Finally we also discussed the idea of using off the shelf cells and assembling their own packs the way Tesla does. Denise said GM has not ruled that idea out but at this time it's not really practical or cost effective. Using thousands of smaller cells makes assembly much more complex and expensive. Nonetheless it's an area that GM has looked at and will continue to examine.

Tags: chevy volt battery, ChevyVoltBattery, Denise Gray, DeniseGray, electric car batteries, ElectricCarBatteries, gm batteries, GmBatteries

David Ganss
Transportation and Climate Division
U.S. EPA -- Office of Transportation and Air Quality
voice: 734-214-4471
fax: 734-214-4958
email: ganss.david@epa.gov